AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.

JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XV. MAY, 1894. No. 173.

SIMPLE METHODS OF PHOTOGRAPHING WITH THE MICROSCOPE.[1]

BY B. ALEX. RANDALL, A.M., M.D.,

PROFESSOR OF DISEASES OF THE EAR IN THE PHILADELPHIA POLYCLINIC; OPHTHALMIC AND AURAL SURGEON TO THE EPISCOPAL AND CHILDREN'S HOSPITALS.

THE praises of photography direct from the microscope have been already rung by men whose success in the employment of this means gives the best possible support to their claims of its value,[2] and the number of those who are using it is daily growing; yet there remain a large numher of microscopists who fail to perceive its merits, or who regard the matter as lying outside of their field of work. They look rather scornfully at the best photographs of microbes or diatoms over which photographic experts grow enthusiastic, and incline to regard as a failure any photograph which falls short of giving the conventional picture of the diagrammatic drawings of the text-books. Even when unprejudiced examination has shown the exquisite fidelity and the diagrammatic clearness which may be obtained by photography, they still regard it as the province of the photographic enthusiast rather than of the practical microscopist. One reason for this is that they rarely see direct photographic

[1] Read before the Philadelphia Pathological Society.

[2] Vide Piersol, Medical Photography, Trans. Phila. Path. Soc., xiii. p. 243.

illustrations used in actual publication, since it must at once be conceded that the reproductive methods now available are far from satisfactory; but probably the most potent obstruction to the widening of the use of photography is the prevalent impression that good results are obtainable only at great expense of time and money. Men glance, for instance, into Sternberg's treatise, only to lay it down with a sigh because all this apparatus is unobtainable; and, overlooking all that may be said about simple or improvised appliances, they resign all thoughts of entering the field.

Such considerations long withheld the writer from essaying the attractive task: but a single demonstration by Dr. Piersol of the possibilities of work by lamplight at once removed his misgivings and opened up the matter to him; and later work has fully confirmed him in the view that there is no reason why any microscopist should not obtain photographic pictures surpassing the highest skill of the draughtsman, not only in their unimpeachable accuracy, but even in their schematic sharpness. And as the demand increases for the direct reproduction of such pictures, there is every reason to believe that the mechanical arts will succeed in furnishing them with a perfection and a cheapness which no present method affords. It may safely be predicted that the time will come when photography will be employed to represent adequately all that the microscope can *show*, and that drawings will be needed only to demonstrate the points which *may be inferred but cannot be seen* in the preparation.

The two questions that most concern microscopists are: What apparatus is necessary in order to obtain good results? and, How may good photographs be gained with a practicable expenditure of time?

Let the beginner first decide what he especially wishes to photograph, and he will be wise not to choose the most difficult possible subject at the outset. Microbes that are almost beyond the highest resolving power of his instrument, do not offer the most favorable opportunities for success, however attractive they may be in this "cocco-phobic" age—objects that are resolved rather by the brain than the objective had better be deferred until

some experience has been gained. Low-power work—too generally neglected—with good, clear sections, well-stained and thin, forms a more reasonable starting-point; and here apparatus of almost absurd simplicity will be all-sufficient. Some sort of camera is requisite; and, while it may be improvised, most men will do better to buy one of the many forms in the market, some of which are especially designed for this purpose. A "long draw" is a great convenience, since it permits of much choice in the amplification and size of the field, but it may be substituted by several cones of different lengths for uniting the camera to the microscope. These cones are easily made of pasteboard or any light-tight material, and constitute the only peculiar essential to photomicrography. Any camera and any microscope thus linked together may be successfully used, and no great skill is requisite in order that the usefulness may be limited to no narrow field. Good objectives are, of course, essential to first-class work, and any defects in transparency, definition, correction for color, or flatness of field, are apt to show in the results. But specially corrected lenses, like heliostats and other special appliances, are unessential, though valuable, and may be left to the expert who has unlimited time and money to devote to the matter, and aspires to the infallible conquest of every object which may be presented to him. The practical microscopist who takes up photography not as an end, but as a means, will usually find that his stand and lenses are equal to his needs in achieving good, and perhaps the very best, results within a fair range of subjects.

As an illumination sunlight is probably unapproachable, not only in its possibilities, but in the extreme simplicity of its employment. "But I have no daytime to give to the work," may seem a crushing answer to that; yet there are few microscopists who in the course of a week could not find one hour of leisure while the sun shone, and one hour of sunshine well used may give thirty or forty exposures, with the possibility of as many good negatives. The north light, which serves so admirably for most microscopical work, must be abandoned in favor of a window into which the sun shines; and, in the absence of a specially adapted table, an inch-plank, about six feet long by a foot wide,

must be so adjusted that the sunlight shall fall upon the mirror of the microscope as it stands upon it, with the tube horizontal and connected with the camera. A vertical position is possible, of course, and may be compulsory in case the microscope-stand has no joint for horizontal inclination, and some fluid preparations may perhaps be thus better managed. In any event, it will be found convenient to secure the camera to the board or table top by small blocks and buttons, and it can then be used in any position, and when out of service may be stood up in a corner. For powers under 100 diameters, the reflection of the sun by the plane-mirror of the microscope, without any accessory apparatus, is all that is required—no condenser is requisite, and without it the heat-rays need not be cut off by a blue-cell. A mirror placed a couple of feet behind the ground glass of the camera (a standing toilet-glass answers admirably) is a great aid in adjusting the illumination, the field, and the approximate focus—then the fine adjustment is made with the aid of a magnifying glass. For this last purpose one of the microscope-oculars deprived of its eye-lens serves admirably, its tube being just the right length to allow of accurate focusing of the rough inner surface of the ground glass. For very high-power work a smoother surface than is furnished by the ordinary ground glass of the camera is said to be requisite, but for moderate powers this answers perfectly. On either side of the true focus the image appears stronger and better defined than at the right point, because its outlines have an appreciable breadth instead of being mathematical lines—"where the image seems to melt into the ground glass" (Piersol) is the point of most perfect adjustment.

Unless the distance to which the image is projected is short, the arm will not reach the fine adjustment so as to allow of the necessary accurate focusing. Dr. Piersol's arrangement is, therefore, advisable—of a cord with weights carried across the head of the fine adjustment screw (taking a turn around it, if it move stiffly), and passing through rings on the base-board, to be carried back along the edge, where it will always be within reach. A similar arrangement for the rack and pinion is rarely needed, since almost perfect focus can be made while standing by the

microscope and looking in the mirror back of the ground glass. As this mirror allows in the same way of exact adjustment of the field to be photographed, no arrangement need be made to detach the microscope so as to search for this with the ocular. In photographing, an ocular may be used to increase the power, or an amplifier may be introduced into the tube; but the beginner will do better to work without either until he has learned to use his objectives by themselves, and has found them in need of such aids.

As to the exposure—use the slowest plate obtainable (such as Carbutt's A), as it gives the greatest latitude, and gives the shortest time that will afford a picture—vigorous development will then give a crisp negative with strong contrasts. If your negatives lack this quality, ask an expert photographer about them, or perhaps take him one or two to develop with you. The microscopist had better develop his own plates—any spare time can be utilized for it, and if night-time be chosen, any room with only a red light in it becomes a photographic dark-room. But he had better have a dark-room, if only a suffocating closet, since he can thus test at once the accuracy of his exposure, etc., and make another trial before changing his apparatus, if the first has not been satisfactory. A negative can be covered up light-tight in its developing-pan, while the operator runs in and out continuing his work, making new exposures, and trying new subjects; but mottling of the plate may result if it is left in the developer without occasional agitation. Such methods are unsystematic and indefensible from a photographic point of view; but the busy microscopist may find that he can by such unwarrantable measures sometimes treble the number of his successes without notably lessening the value of any one of them. Thus developing, one here and there, of a series which he wishes to make, the microscopist can photograph thirty or more preparations in a single hour of good sunlight; and as he puts away his apparatus at its close, he can count four or five finished negatives and some two dozen exposed plates that give promise of being as good as soon as he finds time to develop them. If this time is lacking, they may be turned over to a professional photographer

as may also the tedious process of making paper prints from the negatives.

How long to expose? will always be the cardinal question, and the learner will generally be disappointed at the vague answers he receives from the expert. Hold to one brand of plate (the same emulsion if possible) and one developer, as giving two constants in the problem, and note carefully the lens, the distance to which the object is projected, and the clearness of the atmosphere when the exposure is made; and study your results with an expert when you can. Over-exposure is most usual in working with sunlight, and the developer needs restraining. "Bromide of brains is the best restrainer." In making the exposure some opaque object may be held so as to cut off the light from the mirror while the slide is withdrawn, the exposure made by moving it aside and again interposing it, and then the plate-holder is closed once more. In the writer's work using a 1″ Reichert lens with good sunlight and Carbutt A plates (sensitometer 10), and obtaining an amplification of 25 diameters, the correct exposure is about one-fourth of a second. The light is inversely as the square of the projection distance—so with similar conditions, except double length of draw and 50 diameters, the exposure should be one second. A quick hand can limit the exposure to one-fourth of a second or less—as short as has been found necessary—but a drop-shutter can be improvised to give a smaller fraction as may be desired. Summer sunshine is several times as rapid as that of winter; that of noon is far faster than when the sun is low; very little haze in the atmosphere lessens greatly the actinic power. These are facts in a problem that must be left to the judgment of the operator.

The field embraced in the picture is often an important matter, requiring considerable attention, and care must be taken that the plate shall receive all the essential portion of the image visible upon the ground glass. To this end, the point corresponding to the centre of the plate when exposed should be marked upon the ground glass, and a circle drawn around this to mark the minimum dimension of each size of plate to which the camera is adapted. Since the margins of the plates as bought are fre-

quently faulty, the circle had better be only three inches for a 3¼x4¼ plate, etc.; though the full size of the plate can often be used without unwise economy. The draw-tube of the microscope is generally furnished with a diaphragm, which is of value in giving definition and flatness of field, but reduces materially the size of the field; the entire draw-tube can, therefore, be removed at times in order to bring the periphery of an object into view without any serious compromise of the sharpness.

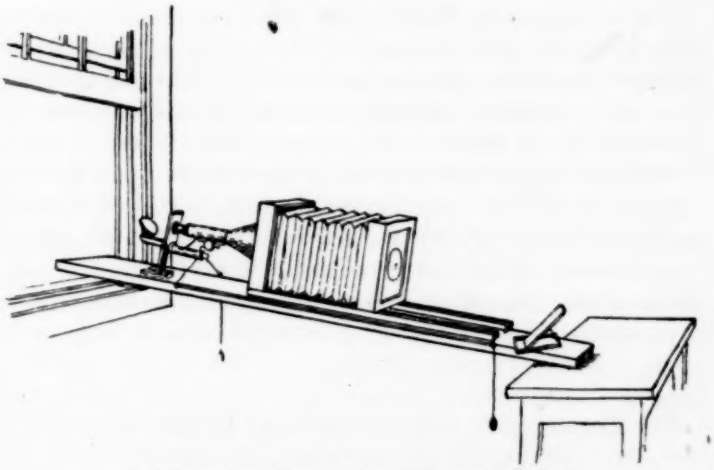
The method of work thus laid down has one cardinal difference from every other—it is working with the parallel rays of sunlight, and the effect is practically to photograph the disk of the sun with the preparation silhouetted against it. Every opacity which intervenes between the sun and the sensitive plate will make its mark upon the negative—dust on mirror, slide, or lens, scratches on the lens front or bubbles in the balsam between the lenses, floating motes in the air, perhaps even sunspots, will show in the result. Stringent cleanliness is therefore requisite. To outweigh these disadvantages, the penetration thus obtained in a thick preparation, by the searching character of the light, will at times far surpass the performance of the same lens with an ocular; while, on the other hand, detail that is out of focus will often be drowned out by the flood of light—just as by the Abbé condenser when used to seek stained microbes in the tissues. A thick, poorly differentiated specimen may thus give a good photograph; yet well-stained, thin and even sections are none the less preferable. Although non-actinic colors have great theoretical advantages, admirable pictures can be obtained from hæmatoxylon preparations. Orthochromatic and other stained plates, as well as Dr. Piersol's method of actinic contrast, may prove a great addition to our refinements; but these are points which need not concern the beginner, who will do better to concentrate his attention on the simpler methods.

If the microscopist must confine himself to night-work, his task will be more difficult. Any lamp will serve as a source of light, and a little night-lamp, costing twenty-five cents, has been the writer's choice. It is to be placed, with its flame turned edgewise, in the line of the microscope-tube, and, except for very

low-powers, some concentration will be required. For this purpose a bull's-eye, or some form of substage condenser, or both, will be needed. One of the objectives can be adapted as a substage condenser, or the B ocular, which Dr. Piersol recommends, may be so employed, if the microscope lacks an Abbé or other regular apparatus; but with any form the problem of an evenly and strongly lighted field will demand careful, painstaking solution. The heat-rays emanating from even a tiny flame can by no means be neglected; or the operator may find his balsam melting, and a most singular streaky picture resulting from movement of the specimen while the exposure is going on. A mere piece of interposed plane-glass or isinglass will cut off much of the heat, or a blue-glass may be used below the stage, but at times the cell of ammonio-sulphate of copper may be needed. Rapid plates are in place for this work, since the time of exposure must always be considerable—averaging at least as many minutes as the sunlight required seconds. A convenient dark-room, however, will enable the operator to carry on several processes at once, and two dozen good negatives may often be made in an evening. With powers above 100 diameters the writer has done rather better work with lamplight than with sunlight; but this is because he has never prepared himself for high-power work. Concentration of the light is needed for such work, and can be used with safety to the objective and preparation only when the heat-rays have been eliminated—a matter easier with lamplight than with sunlight.

A few words in recapitulation. By securing a camera, with a cone to connect it with his microscope, a piece of plank, a developing solution, some hyposulphite of soda, a ruby light, a few pans, and some dry plates, the microscopist has the needed outfit for beginning his photographing. The outlay will be from $20 up, but may be greatly lessened if the camera is made, borrowed, or bought second-hand. Fastened to its base-board, the camera may stand out of the way in a corner until wanted; then in five minutes all can be gotten into readiness for work. The apparatus is to be so placed that the sunlight falls upon the plane substage mirror (projected out of the window if necessary), and the light

reflected into the instrument. The standing-mirror is placed at the far end of the apparatus, so that the operator as he stands by his microscope can see the ground glass reflected in it; then it is easy to adjust the illumination, find and centre the



An improvised apparatus for photographing with sunlight

field, and get an approximate focus. Accurate focusing is then done with the aid of a magnifying glass, and the plate-holder charged with its sensitive plate is substituted for the ground glass. An opaque object is held so as to cut off the sunlight while the slide is drawn, is removed and replaced, so as to make the brief exposure desired, and then closing his plate-holder, the operator detaches it, and seeking his dark-room proceeds to develop his negative, and reloads. A miss may call for another shot—a hit will open the way to a long series of results more or less successful. Taking careful note (written as well as mental) of each exposure, the microscopist will quickly become master of one situation at least; and, while he must expect varied fortune when he changes the conditions and enters unknown territory, he will find much of it open to ready conquest, and having once entered the field, he will not quickly be willing to quit it. Let

him begin with sunlight and a good low-power objective, and he will quickly achieve brilliant results, which the expert can hardly excel; and even though he makes no attempt to enter other fields, he will find that he has made a most valuable addition to his powers as a microscopist.

The accompanying illustration is from a photo-micro negative made by Dr. B. Alex. Randall. The specimen is a longitudinal section of the lower "lachrymal canaliculus," or tear-passages, from the "punctum" or little prominence on the inner edge of the eyelid to its entrance into the tear-sac. It was prepared (carmine-stained) and photographed by sunlight, using parallel rays and a slow plate (gelatino-chloride, such as Carbutt A) with an exposure of a quarter of a second. The point for special demonstration was the set of muscular fibres, transversely cut, which surround the entrance at the "punctum," and form a sort of purse-string or "sphincter." The amplification is X 24.

The Photographic Convention of the United Kingdom.—This year's meeting of the Photographic Convention of the United Kingdom will take place in Dublin, during the week beginning on the 9th July proximo. The proceedings will be opened by a conversazione, which promises to be very largely attended by representatives of all the Dublin Scientific Societies and kindred bodies, and will be held in the rooms of the Royal Dublin Society. The convention meetings and exhibition will be held in the large hall of the Photographic Society of England, 15 Dawson street. Mumerous excursions to places of interest in and around Dublin will be arranged, and there will also be longer distance excursions to the scenery of County Wicklow, the Vale of Avoca and the pre-historic remains of the Valley of the Boyne with its Celtic crosses and caves. It is also probable that marine excursions will be the means of viewing the beauties of Dublin Bay, so justly compared to the Bay of Naples, and it is also likely that entertainments and receptions will be given under special patronage.

Our esteemed contempory *The Photographic* (London) *News* in the issue of March 9th, 1894, republishes without credit our translation of "Photographic Reproduction," which appeared in the AMERICAN JOURNAL OF PHOTOGRAPHY for March, 1893.

HAS THE PROFESSIONAL ANY USE FOR THE HAND CAMERA?

A free translation from the German by JULIUS F. SACHSE, after G. Heinrich in the *Photographische Chronik.*

WITH the average professional photographer, the hand camera is the distinctive mark or badge of the pronounced amateur. He looks down with contempt upon the whole guild of button-pressers, and consoles himself with the thought that such child's play is unworthy of the serious consideration or notice of any self-respecting photographic bread-winner.

Then again he is fully convinced in his own mind that little or no business or profit can be gained by running around with a hand camera. These are opinions shared in common by most all of the fraternity.

And yet this view is an erroneous one, as the hand camera, under certain conditions, is well suited for commercial purposes, and the writer wishes here to emphasize, that no professional photographer who wants to be abreast of the times, can afford to be without a hand camera, even granting the fact that it would not be brought into daily requisition.

There are multitudes of cases where the hand camera can be made to well pay for itself. However, it is well to remember here that it will not do to judge of the value of such apparatus by the usual results shown and attributed to that class of photographic apparatus.

A good hand camera in competent hands with proper manipulation is capable of producing wonderful results.

In all large communities, there are to be found firms or establishments whose chief specialty consists in making instantaneous views, and of what is known as "accident" photography. Such firms are equipped with special portable outfits, made for the purpose, and which, suitable as they may be, are also expensive; consequently the photographer who is called upon only at intervals for such work, can but with difficulty compete with establishments that make a specialty of this branch of work.

But in smaller towns or communities the situation is entirely different. When anything happens that it is desirable or requisite to immortalize, by aid of instantaneous photography,—and such cases are by no means rare;—it is ludicrous to observe the procedure of the local or resident photographers, the tremendous show of cameras lugged to the scene, often with enormous portrait objectives, and unsteady tripods or unstable supports, an array of implements entirely unwarranted by the meagre results obtained.

Now how different would the case be if the above operators were in possession of suitable hand cameras of approved make and construction, and were familiar with the manipulation and scope of their instruments. Then the parade of paraphernalia, as in the first instance, would not only be less imposing, but little apparatus would have to be handled, and that without expense or loss of time, and what is still more important than all, better results would be the reward.

With a suitable hand camera of modern construction, and sensitive material, together with a fair light, almost any photographic obstacle may be surmounted.

Naturally no reference is here made to "shoddy boxes," such as are made for persons who have means enough to buy an outfit one day because it is cheap, and throw it aside the next day because it is useless.

In a hand camera the main requisite should be a good objective or lens. To obtain the best results a Zeiss anastigmat of 5½ in. focus, that works with *f*-6.3, or better still a Goerz double anastigmat *f*-7.7, with 6 in. focus should be selected. Of the two makes the latter objectives are preferable, as notwithstanding its lesser illuminating power, a 4x5 plate exposed with a full opening is covered with an absolute microscopic sharpness of definition. Stopping down only becomes a necessity when the light is too strong or a great depth of focus is desirable.

The question will now arise with the professional photographer, how can the small pictures thus obtained be utilized, how can he realize a profit from his material and labor,—where are purchasers

to be found for such small prints, and above all who will be willing to pay a remunerative price for such pictures?

If the operator at this point will recall the possibilities of his enlarging apparatus, it must dawn upon him, that if that special department of the business ever paid, it must do doubly so with such subjects as are offered by snap-shots. Granting that the camera was held steady, and a reasonable focus taken, the resultant negatives obtained by use of either of above named objectives, or any other good lens, will be found to be almost microscopically sharp, and will permit of considerable enlargement without suffering in definition.

In connection with this subject it is advisable to use a transparency or gelatino-albumen plate (such as Carbutt A) for the diapositive. Care should be exercised in exposure and development to obtain a picture soft and full of detail in both high lights and shadows, it thus becomes an easy matter to enlarge this positive in the camera to 5x7 or 6½x8½ without loss of definition. If requisite care is exercised the enlarged negative cannot be distinguished from an original exposure.

When hand camera negatives are to be enlarged it is absolutely necessary that the original negative be developed with special reference to its subsequent use. It should be rich in detail and soft, hardess and contrasts must always be avoided. It is not difficult to obtain these results, if the subject was properly lighted, for the plates used and time of exposure. The only thing then wanted is a suitable developer.

Experience has proved that the best solution for this purpose is the ordinary oxalate and iron developer used in connection with a preliminary bath of hypo (1 to 2000). But even better than this old stand-by, Rodinal now looms up. When diluted 1 to 100, six or eight plates or films can be developed at one time in the same tray, care being taken to keep it covered. The development proceeds so gradually that even a larger number can be observed at a time.

Granted that a good hand camera equipped with a suitable anastigmat is rather expensive in the first instance, any enterpris-

ing photographer can soon re-imburse himself for the outlay by the income derived from its use.

The hand camera has long since ceased to be a scientific toy, and has become a necessary adjunct to the outfit of every professional photographer who wishes to keep abreast with the present age of scientific development.

KEEP UP YOUR PRICES.

BY XANTHUS SMITH

"BIG trade and small profits" is a very poor business scheme for the photographer.

The art of photography, though a mechanical art, in a great measure, is one which requires an amount of skill and talent which puts it away above many of the ordinary trades pursuits, and when conducted as a business it requires a combination of artistic talent with method and business tact which puts it out of the pale of the line of requirements of the mere tradesman.

To simply buy and sell at a profit is one thing, but to successfully conduct a creditable photographic business is another. When the tradesman increases his business by small profits and increased sales it is a comparatively easy matter for him to call in aid to do the mere handling of the goods, but this is not the case with the photographer.

A well conducted photographic business must necessarily be evolved in so large a degree from its head that too great an extension of it, or manifestation of it, must necessarily result in its deterioration and ultimate dissolution. So little is it understood generally that the work of an artist must necessarily be the unit of his brain and hands, that the remark is often made to artists, "I suppose when you are very busy you call in help." Now there can be no help for a true artist in the pursuit of the higher branches of his art, and although this may not truly be said to be the case with the photographic artist, yet his pursuit par-

takes so much of the character of a fine art, if he be a good photographer, that he cannot extend his skill beyond a certain point. He must personally and by his own individual talent conduct and supervise his work, and, therefore, if he is taxed beyond a certain point he must needs break down or his work must be of inferior quality.

What a temptation there is bearing the whole time upon the photographer who has cut his profits down to the very lowest point, to let his work go at just barely passable and that is all. Over-strained, as we will admit he may be, by a reduction of prices, for a time at least, he has not the necessary leisure to consider and improve as he goes along; more must be relegated to assistants, with less personal supervision, and the consequences must inevitably follow that there will be tardiness in filling orders and unequal and imperfect and consequently discreditable work. Want of promptness and inferiority of production will tell sooner or later in the photographic business. It must be admitted that there are always foolish people to be found who will be attracted by the cry of cheap. But the photographer must remember that it will not do for him to attempt to cater to this class—because his business cannot be conducted upon a sufficiently extended scale, as the cheap clothing business may, to enable him to acquire a fortune or a bare competence even before his cheap ways have swamped him.

Let any enterprising, talented, incoming young photographer take the pains to instruct himself in the business methods of those photographers who have come out best, both financially and in reputation, after a twenty-five or thirty years career in the business, and see whether the successful men have been the cheap men. We think he will find that those who are best off are the ones whose aim it has been to produce good work, work such as they might always feel did them credit, and who adhered strictly to fair prices—prices which remunerated them in a fair way for the labor and talent which they bestowed upon their work.

Any sensible individual, if he stops to reason, will see that it is a mean spirit of rivalry, which can only end in short-lived success,

to plant yourself beside an honest, well established photographer, either in city or country town, and by cutting prices rob him of a share of his well-earned business. If you continue, you ruin the profits for both. If you, after a time, remove, to repeat your game in a new location, what have you gained? Surely nothing in reputation, and the expenses of bandying about will soon have eaten up your miserable, scanty profits. If it becomes necessary to locate yourself in the vicinity of others of your craft, honest, good-price men, or cheap men let them be—keep your prices up, and let your competition with them be in the excellence of the work. Instead of doing cheaper work than they do, do better work. Let the competition be a *best man* competition and not a "cheap John" competition, and if you crowd out your rival, it will then be simply carrying out one of nature's infallible laws, namely, the survival of the fittest.

The photographer, somewhat like the artist painter, should not espouse his business with the sole view to making money. If his aim be the acquiring of a fortune he should choose another field for his talents. A few instances there may be, wherein a considerable amount of money has been acquired even in a comparatively short time by photographers, but these must be looked upon decidedly as the exceptions and not as the rule. Such instances have been the result of remarkable business tact and skill, and fortunate location, certainly not of cheap work.

True it is that there are instances of what may be called daring men in their pursuit, whereby skill, together with assumption, and bold business methods, succeed in obtaining very high, we might well say exorbitant, prices for what they do. They cater to a small class, that think because a thing costs much it must necessarily be of superior quality. But this class is too small to make a general rule of such business a success. It is much safer to aim for the individual who wants a good picture, and is willing to pay a price for it that will honestly repay the skill bestowed upon it—and neither more nor less.

Never be discouraged.

THE OLD GULPH MILL,

A REVOLUTIONARY LANDMARK IN EASTERN PENNSYLVANIA.

(By permission of W. S. Baker, Esq.)

NEGATIVE AND REPRODUCTION BY J. F. SACHSE.

SUITABLE RETOUCHING SURFACES.

WE have of late heard of so many complaints from what may be termed outside retouching establishments that they are supplied with negatives which cannot have justice done to them on account of their poor and uneven surfaces, that it may be useful to some of our readers to point out some desirable conditions in this direction. We are not about to write a disquisition upon retouching merely upon a point of practical photography not bearing on this work alone, as it also applies to other consideration. To be able to retouch to perfection, the surface to be worked upon must bear as close a resemblance to a piece of ivory prepared for painting upon as can possibly be produced. This is little more than stating that the surface must be perfectly even and quite free from inequalities. Further, a negative possessing such a surface is also best suited for many others—notably for enlarging them, for transparency-producing, and for the rendering of minute detail generally. The requirements are connected both with varnished and non-varnished surfaces, for, as is well known, some retouchers prefer to work on the film suitably prepared to receive pencil, while others choose to stipple or hatch upon the varnish. The latter, again, are divided; a varnish which will permit the application of retouching without the intervention of "medium" or abrading being the choice of some retouchers, while others, again, will have a hard varnish surface, to be afterwards prepared by either abrasion, or a thin coating of medium, to receive the pencilling. But, whichever mode is adopted, if delicate work is to be done, the surface must be even.

The advantage of working on the film direct is that there is greater probability of a suitable and even surface, seeing that whatever unevenness may be present upon it is generally intensified after varnishing; and, beyond this, the varnished surface may of itself possess unevenness. The disadvantage of this method is that sometimes the retouching—the result, perhaps, of hours of labor—may be slightly or seriously disturbed during the after-

varnishing. The counterbalancing gain is, however, very great. The same retouching, once protected by varnish, is secure from after-injury, no matter how many prints are required from the negative; and, if it be slightly stirred during the varnishing, a few after-touches will generally suffice to put it right.

When we come to a consideration of retouching done in the first instance upon a varnished film, the first advantage that strikes us is that, in case of alteration, it is easy to remove or alter any portion of the pencilling, while with film-retouching the power to remove it involves obtaining a print from an unvarnished plate, which is always to be deprecated in view of a possible setting-off of the silver, and consequent injury of the negative. However, many workers prefer this plan, and the only remaining difficulty is the protection, by a second coat of varnish, of the work of the retoucher.

Few, if any, mediums used for the purpose may be relied upon to a complete certainty that they will not cause the retouching either to float away altogether, or at least to move and blur in parts. Yet to leave the retouching unprotected means to stand the chance of finding it, after a number of prints have been taken, so specked and soiled as to need patching by the retoucher. This is generally the case if the negative be one that is put away and liable to be needed from time to time.

There is one very important, and little-noticed, peculiarity which varnished films are liable to that we may here draw attention to. When using a hard resistant varnish, if, in course of use and its having become too thick, it be thinned with spirit beyond a certain limit, it seems liable to become more resistant, and the usual treatment with medium fails to give a surface that will take the pencil properly.

After thus fully discussing the various modes of preparing the negative for the retoucher, we now return to the condition of its surface. The great and most common source of unevenness comes from copious working with unfiltered water, This, which sometimes may be unavoidable, should always be followed by a gentle cleansing of the surface by a pledget of wet cotton-wool, followed by a flush with clean water. It is remarkable how great

with some waters is the amount of "grittiness" of surface the negative may exhibit.

Another cause that we do not remember having seen noted is in the use of the acid fixing bath. Sometimes, when this is used for the first time, a kind of deposit is produced upon the surface of the film which we have seen attain the dimensions of an absolute scum. Care, therefore, should always be taken, when so using the fixing bath, to note whether this appearance be present or not. It is, however, also removable by the cotton-wool, but it needs considerable friction.

The use of backed plates when a pigment is employed is very liable to cause a rough surface through deposit of pigment particles, unless the rag be well rubbed after washing, and the more is this probable, seeing that in the dark room this deposit might easily escape attention.

Finally we must speak of the varnishing. It is absolutely necessary, if a pure, even surface is required, that the varnish should be continually filtered. The usual plan with careful workers is to use one bottle to varnish from, and another provided with a filtering funnel to receive the overflow from the plate. By this means a limpid clear solution is always available for every negative. In conclusion, if we were to put our own view as to how the requirements as to a suitable retouching surface should be ensured, we would say: Cleanse and wash every negative after its washing in running water, retouch on a suitably prepared film, choosing, if possible, a medium that the varnish will not touch, and give a final varnish to protect the pencilling from future injury by abrasion or absorption of dusty or fluffy particles.—*Exchange.*

Never appear something more than you are.

Take time to consider, and then decide positively.

Carefully examine into the very details of your business.

HOW MIRRORS ARE MADE.

A HALF hour spent in a factory where mirrors are made will well repay those interested in the manufacturing industries of the present day. Mirror making in America has reached the perfection of the finest French plate. The clear, unblemished glass is first placed on a table with the pattern into which it is to be cut underneath. The cutter with a single stroke of his diamond quickly reduces it to the desired shape. It is next taken to the rougher where it is beveled. The rougher consists of a revolving steel plate which receives a limited quantity of sand held in suspension by a tiny stream of water flowing from a hopper in the centre. The disks, about two inches in thickness at first, are, by the constant friction, reduced in two months' time to very thin plates. The sand used in this process is yellow, and under the microscope presents a very irregular edge. This ruggedness is desired because it increases friction. (Smooth, white sand is used, however, in the manufacture of glass.) This yellow sand has been both sifted and washed before it enters the hopper. The glass now goes to the emery wheel, which straightens the bevel to the exact width. For this purpose a little wooden instrument called a gauger is used. The glass then travels on to the smoother. The smoothing stone is of a reddish appearance and about four inches in thickness. From the smoother the glass pasaes to what is known as the white wheel. The wheel is a circular section of willow wood, on which the beveled edge is ground with white pumice stone. The last stage in the beveling process is now reached. It is called roughing. This wheel is also a section of willow wood, covered this time with felt. Here the bevel receives a high polish. The rouge used is a solution of iron, glass and sand. Its composition is a secret the writer surprised from the workman; so don't you tell anybody. The glass plate is now submitted to the examiner, who indicates with white soap the slightest stain or scratch. These are removed by the blocker. He places the glass on a flat table covered with a flannel blanket, and with a felt rubber brings it to a perfectly smooth, polished

surface by the muscular force of his arm. The glass is now ready to be silvered. Mercury or quicksilver is no longer used in making mirrors, owing to the high rate of mortality that prevailed among the men engaged in this industry. Indeed, it is said that a perfect specimen of manhood after three years spent over the fumes of quicksilver would be reduced to a wreck of his former self. The composition of pure silver now used is readily soluble in distilled hot water. The plate of glass is placed on what is called a silvering table. This table, covered with flannel, is kept at a uniform temperature by pipes of hot water running underneath. The workman pours the solution of silver from an ordinary white delf pitcher upon the glass. A half hour later he lifts the glass from the table where it has received an even setting of silver. The water has run off into the blankets, then drained into the trough surrounding the table. The blankets charged with the surplus silver become valuable in a remarkably short time. The silver extracted from these, together with that which runs off into the trough and is precipitated into the tank below, is refined in the factory and then sent to the silver works, where it is again put into marketable shape. Many old mirrors are brought here to have the silver taken from their backs and thus refined. If such imperfections as pin-holes are found in the mirror after it receives the first coating of silver it is again subjected to similar treatment. The silvering process now finished, the mirror receives first a coat of shellac, then of red paint, when it is ready to be packed and shipped. A process known as chipping or etching is also carried on here. Among the workmen in the shop visited by the writer was an intelligent Turk. He had not only traveled a great deal, but unlike the ordinary tramp abroad he retained his habits of industry, and was quite a satisfactory workman. The Frenchman was also here, who with the acknowledged affability of his nationality entertained and amused his visitors, yet preserved with scrupulous fidelity all the secrets of his trade by his non-committal replies. So much for mirror-making.

Shun liquors.

REMARKABLE RESEARCHES BY DR. R. ED. LIESEGANG.

ALUM AS A SENSITIZING MATERIAL FOR PAPER.

IN the current issue of the *Archiv*, Dr. R. Ed. Liesegang details some results he has obtained as an outcome of a study of the so called Niepce phenomena, where the phosphoresence of paper has been believed to bring about various photo-chemical reactions.

In one of Dr. Liesegang's experiments, paper was impregnated with potash alum, and by an exposure of three minutes to sunlight such a change took place that those parts of the paper upon which light had acted were able to slightly reduce nitrate of silver; but by a further treatment with gallic acid these exposed parts became quite black, the unexposed parts remaining nearly white.

Paper treated with oxalate of soda, sulphite of soda, arsenite of soda, and several other alkaline compounds, showed a similar sensitiveness; while exposures on paper, treated with chloride, several organic acids, and sulphate of hydroxylamine, gave full brown images on development with silver nitrate and gallic acid the unexposed parts remaining quite white in these cases.

Liesegang thinks it probable that in the cases just mentioned, the alum for example, no true chemical decomposition takes place under the immediate action of light but that light is stored in the prepared paper by a kind of phosphoresence. This view is supported by his observation that the impression of the light is only good for a short period; so that if paper prepared with alum, or sulphite, or soda, is kept in the dark for three hours after exposure no image is obtained on development.

It must be remembered, however, says Dr. Liesegang, that the disappearance in the dark of the effect of exposure cannot be taken as conclusive evidence of the absence of true chemical action, as we have instances of a similar disappearance of the image in he case of true phototypes — certain bismuth compounds, for example.

Pure paper, in the hands of Dr. Liesegang, showed, even after long exposure, no reducing action upon silver nitrate.

When paper is prepared with a solution of sodium nitrate and exposed, an image is obtained on treatment with silver nitrate followed by gallic acid; the nitrate being oxidised in this case to nitrate where the light has acted. As bearing on this reaction Liesegang cites the experiments of Laurent published in 1891 which show an action of light the reverse of that now mentioned. Laurent exposed a sterilized solution of pure potassium nitrate to sunlight, and after several days he traced the presence of nitrate in the solution; while samples of a similar solution which had been kept in the dark showed no reaction of nitrate.

In a subsequent experiment he formed 41 cubic centimetres of oxygen were liberated in one particular flask of the nitrate when exposed to light for two months.—*Photographic Work.*

A LETTER FROM SECRETARY ROSCH.

AS Secretary of the P. A. of A. let me urge upon you the necessity of becoming a member of our Association.

It was organized in 1880 as a National Organization, and its objects were to create a friendly intercourse of feeling in the photographic fraternity, to establish a higher and more perfect system of conducting our business, and for many other motives too numerous to mention at this time. As a National Organization it should have enrolled in its membership the greater part of our photographers, and should truly represent and be indicative of a Nation's Photographic Association, and so great should our exhibitions be that it would clearly demonstrate without the question of a doubt that we represent a Nation's pride *and a great Nation as photographers.* The time has come when photographs are "home ornaments," and can be found in every hut and mansion throughout our country. The time has come when our Nation looks up with pardonable pride to our profession, and yet we as a Nation's Organization are standing still purely because

of a lack of energy to aid and support the objects for which our Association was formed. Its present condition, however, can be attributed principally to a lack of policy among its past officers, who have principally had the success of the Convention to which they were appointed its officers at heart, thus losing sight of much of its future demands and policies. Many men were elected, who were very energetic and able men, but were unable to carry out their purposes for reasons of other brother officers who lacked energy and ambition; thus the Association dragged on from year to year, until now it has been placed in the hands of the younger element, all of whom are working hand in hand for its future good and prosperity.

A meeting of the Saint Louis photographers, dealers and manufacturers will be held in April, at which time all arrangements will be made for the entertainment of the visiting members and plans formulated to carry on all necessary matters thereto.

Send me your name and I will mail you application blank and other matter that will interest you. If you are a member and have changed your address since last convention write to me and I will remail *you* matter that has not reached you because of your location.

Don't miss the Saint Louis Convention.

J. Ed. Rosch, *Secretary.*

Architectural Photographs.—Through a recent gift the School of Architecture of the University of Peensylvania has been able to add to its library a large number of books and photographs, which are invaluable to students in this subject. The books have begun to arrive at the University, but many which have been ordered from abroad are still on the way. Among the most important works added to the library are four volumes of photographs just received from Paris, which consist of the original drawings of the "Restauration di Monumenti Anciens," and of the "Grande Prix de Rome" drawings. The latter are selections made from the prize drawings from the year 1823 down to the present time.

VISUAL SIZE-DISTINCTNESS.

FRED W. FOSTER.

OBJECTS, seen under usual conditions by average observers, have a degree of distinctness which is proportionate to the size of the object as seen, that is, to its visual magnitude or visual angle.

The more distinctly, within the range of clear vision, an object is seen, the larger is its visual angle; and conversely.

Let us call this relationship the normal visual size-distinctness.

Photographs are designed to be looked at by average observers at definite visual sight-distances of from less than one foot to several feet.

Let us call these designed distances normal sight-distances.

Photographs viewed at normal sight-distances do not all show the chief objects depicted in them with normal visual size-distinctness.

Photographs viewed at normal visual sight-distances may depict objects with *variations* from normal visual size-distinctness, thus :—

CLASS.	SIZE OF VISUAL ANGLES	DISTINCTNESS IN DETAIL
	OF THE CHIEF OBJECTS IN PHOTOGRAPHS VIEWED AT NORMAL SIGHT-DISTANCES.	
1	Increased	Increased
2	Normal	Increased
3	Diminished	Increased
4	Increased	Normal
5	NORMAL	NORMAL
6	Diminished	Normal
7	Increased	Diminished
8	Normal	Diminished
9	Diminished	Diminished

All photographs belong to one of these nine classes.

If a photograph be held in right position near the spot where it was taken and at normal sight-distance from the observer's head positioned exactly where the camera was when the photograph was taken, the chief objects depicted in the photograph can be viewed in reality and in the photograph, side by side, and a comparison of the size-distinctness of the chief objects, in reality and as depicted, will show to which one of the nine classes the photograph belongs.

Very few of the vast number of photographs taken belong to the normal (number five) classs.

How can one determine to which class the photograph of any given object should belong in order to achieve any desired photographic result in the fullest degree?

How can we arrange and control the optical mechanics of our processes so as to insure taking the class of photograph we desire?

Will some one collect the relative facts and publish working formulæ for each of the nine classes of photographs?

Photography of normal size-distinctness has value and claims to our consideration, from scientific, æsthetic and educational points of view, that are not achieved by the mass of contemporary photographic work.

Experiments in size-distinctness may be made by photographing a broadside sheet printed in many different types of known size, from quite small ranging up to two-inch letters, hung vertically at known distances from the camera.

The Thornton-Pickard Manufacturing Company of London have opened an American branch at 2 Park Square, (opposite Providence depot, Boston, Mass., for the supply of the Thornton-Pickard shutters and other specialties, which have obtained a wide reputation. Among the chief claims of this company for American patronage is the low price and excellent finish and lasting qualities of the Thornton-Pickard shutters, also that they can be used before or behind the lens, and are supplied for lenses of any make or size. There is no dividing of the lens tube nor expensive fitting. Further, they are made to standard sizes, and by means of patented rubber moulding are fitted to any intermediate size of lens.

REGARDING THE TREATMENT OF ORIGINALS FOR PHOTO-ENGRAVING.

A FEW directions concerning the treatment of originals for process engraving may be of value to printers not particularly well informed in the details of this branch of the art, in that they may gain an idea, more or less definite, of what may and may not be possible of accomplishment with photos and engravings of doubtful merit that happen to fall into their hands. An expert in process engraving will often be able to secure very good results from relatively poor copy, but not everyone engaged in process reproduction is entitled to this description, and while this much to be regretted condition continues, it will be necessary to take the varying skill of engravers into consideration when estimating results.

In order to secure the best results for photo-engravings it is always necessary to pass competent judgment upon the condition of the original. In either half-tone or line engraving, the image being reproduced on metal by photo-mechanical methods, the original is often capable of being treated in such ways as shall render a more satisfactory result than could be obtained otherwise. Originals vary so much that it is desirable to discuss them under different classifications.

The most common class of originals for photo-engraving is, of course, the ordinary line work, the engraving being known as the relief plate. Originals are in pen and ink, or on special lined or grained papers. Black ink is generally the first essential. In general practice, high lights are often secured by cross-lines, and trimming up the edges with white ink.

Half-tone engraving has become the most important branch of photo-engraving. The question as to what can be reproduced by half-tone engraving is best answered by the expression, "anything that can be photographed." The originals are ordinarily photographs and drawings in oils and washes. Many excellent results are also obtained from photogravure originals.

Since the photographs used for half-tone illustrations vary from almost every kind of amateur and professional prints made under every conceivable condition, they call for a greater variety of retouching than is the case with other classes of originals. It is fully as often the case that there is need of strengthening the shadows as much as retouching the high lights. Common instances of this are where light draperies appear in costumes or backgrounds. It is necessary to strengthen the outlines or shadows in order that there may be a distinction between the different parts of the picture in the reproduction. The addition of such details often prevents a chalky appearance. In retouching ordinary cabinet photographs the prints can often be imgroved by strengthening the high lights in the eyes and other points in the features, and sometimes by drawing a distinct line between portions of the head or costume and the background. While the distinctions may be evident in the photographs, they are often lacking in the reproduction.

In some cases it is desirable to remove certain portions of the original, or to change the picture entirely. As a common example of this work, a recent photograph gave an excellent view of a noted horse, while equally prominent was the figure of a man at the horse's head. In the background was a fence of nearly the same strength of color as the figure; and the man was entirely painted out, the outline of the fence being supplied by the artist's imagination. Going still further, all traces of the halter were removed from the horse's head, leaving the picture as complete and natural as possible. In the case of buildings, it is sometimes desirable to supply names, also to remove objectionable points. Signs can be very successfully painted upon the photograph by any good letter designer. In street views, it is often the case that blurs are caused by the movement of the figures. These defects are easily removed, either by painting in the details of the figure, or else by entirely removing the traces by painting in the details of the street, or background.

Oil paintings yield very artistic plates, the rough texture of the originals giving a pleasing detail of background. In the case of wash drawings, it is often necessary that the lights and shadows

should be exaggerated in the originals in order to yield sufficient brilliancy in the reproductions.

In the matter of vignetting photographs, it is often desirable to shade off the edges with paint, being a softer edge to work upon in the plate.—*Photo-Answers.*

INSTANTANEOUS PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, C.B., D.C.L., F.R.S.

IF any point in an object is represented by a disk about 1-100 of an inch in diameter, it is sharp to the eye. If, therefore, all movement of the object can in the image be confined to this amount, it will appear sharp. Now, with a hand camera, the focus of the lens is usually about 5-½ inches, let us say 6 inches. At 50 feet off, therefore, an object may move through 1 inch and still appear sharp—that is, the motion during the time of exposure may be that amount. Say that the time of exposure is 1-50 second, it is evident that the object at 50 feet off may move at the rate of 50 inches—say 4 feet—a second to fulfill the conditions. Now, a man may walk two steps of 2½ feet each in a second, and supposing he moves uniformly across the view, he would just move a *little* too quickly. Let him be 100 feet away, and he would be well within the limit laid down. If he were approaching or receding from the camera, of course the circumstances are changed, and the movement he makes in regard to the plate would be a slight up-and-down motion, and no movement would be perceived until he was quite close to the operator.

Let us take another example—an express train going about 40 miles an hour. During 1 second it moves about 60 feet. If it be desired to take this at a distance of 100 feet away while rushing across the field of view, it is not hard to see that a movement of 60 feet would require a rapidity of exposure of 1-750 of a second. If it be taken at a distance of 750 feet, it would fulfill the required condition with an exposure of 1-50 of a second. Express trains have been taken, but as a rule they are coming in a marked degree toward the operator, which immensely reduces the apparent motion. The motion of a breaking wave is small

comparatively, and it will be found that for pictures of this description 1-10 second is not too small an exposure with a lens such as is used with a hand camera. It must not be inferred that this is recommended, but only that such can be given without any great loss of sharpness. For street views the shortness of exposure should only be limited by the rapidity of the plate and the ratio of the aperture of the stop to focal length that can be secured. There are scarcely any shutters which expose more rapidly than the 1-60 of a second, though, of course, there are some; but none that the writer has used is less than the 1-100 of a second, and this is a very rapid rate. This only applies to shutters at the lens itself, and not to those next the plate. These last can be made to expose any part of a plate to almost any small fraction of a second by narrowing the slit which passes across it.

When instantaneous views are taken with lenses of longer focus, of course the limit of motion in an object is narrowed down proportionally; that is to say, with a lens of 12 inches focus the distances given in the examples must be increased proportionally, or doubled. This shows that in the quarter-plate picture it is more easy to secure sharpness than in, say, a whole-plate picture since the focal length of the latter is, as a rule, longer than that of the former.

We may as well give a rule to find what motion is allowable. Divide the distance of the moving object, in feet, by the focal length of the lens in feet, and divide the product by 100, and it will give the result in inches. Thus if an object is 90 feet away from the camera, and the focal length of the lens is 12 inches (or 1 foot), the object may move $\frac{90}{1}$ by $\frac{1}{100}$, or, 9-10 inch during exposure. To ascertain if the shutter is sufficiently rapid to be within the limit, divide the allowable movement in feet by the rate of movement in feet per second. Thus, with the above, if the object were moving 10 feet a second, the speed of shutter required would be $\frac{\frac{9}{10} \times \frac{1}{12}}{10} = \frac{9}{1200}$ of a second, or about 1-130 of a second—a time too small for most shutters. If sharpness be required with a shutter exposing 1-50 of a second, the object should be taken at $\frac{130}{50}$ by 90 feet, 234 feet off, or in round numbers 80 yards off.

THE LETTERS OF J AND W.

IT is a fact not so well known but that it may be said to be curious, says a writer in the *Cincinnati Times*, that the letters j and w are modern additions to our alphabet. The use of the j may be said to have become general during the time of the commonwealth, say between 1649 and 1658. From 1630 to 1646 its use is exceedingly rare, and I never as yet seen a book printed prior to 1625 in which it appeared.

In the century immediately preceeding the seventeenth it became the fashion to tail the last i when Roman numerals were used, as in this example: viij for 8, or xij in place of 12. This fashion still lingers, but only in physicians' prescriptions I believe. When the French use j it has the power of s as we use it in the word vision. What nation was first to use it as a new letter is an interesting but perhaps an unanswerable query. In like manner the printers and language makers, in the latter part of the sixteenth century, began to recognize the fact that there was a sound in spoken English which was without a representative in the shape of an alphabetical sign or character, as the first sound in the word wet." Prior to that time it had always been spelt as " vet," the v having the long sound of u or two u's together. In order to convey an idea of the new sound they began to spell such words as " wet," " weather," " web," etc., with two u's, and as the u of that date was a typical v, the three words mentioned above looked like this: " vvet," " vvether," " vveb." After awhile the type founders recognized the fact that the double u had come to stay, so they joined the two v's together and made the character so well known as w. I have one book in which the three forms of the w are given. The first is old double v (vv), the next is one in which the last stroke of the first v crosses the first stroke of the second, and the third is the common w as used by type founders of the present day.

—*The American Art Printer.*

INCREASING CONTRASTS IN PHOTOGRAPHS.

ACCORDING to the *Scientific American*, if a negative is very weak, and it is desirable to increase the contrast, print until the shadows are darker than is desired in the finished picture. There is quite a little latitude in the printing, and experience will soon teach the right amount. Tone as usual, but bear in mind that under the following treatment the silver, not the gold, is dissolved, so that the finished print will have the appearance of having received further toning. If an absolutely black and white picture is desired, the toning should be carried tolerably far.

After toning, immerse in the following, which should be made up fresh for each batch of prints:

Ferricyanide of potassium	1 grain.
Water	16 ounces.
Nitric acid	30 minims.

Leave in this from one to five minutes, according to the contrast needed. The time cannot be told accurately by the appearance of the prints, for they are reduced very little in this solution.

After removing, wash slightly and place in fixing bath, which is made as usual, and in the case of solio paper use the formula given by the makers. In the fixing bath the prints rapidly become lighter, and if they have remained long in the previous bath the contrast produced will be very great. Leave in the fixing bath perhaps a little longer than usual, to insure the removal of all the silver salt. When fixed, wash as thoroughly as usual.

If in the ferricyanide solution the nitric acid be omitted, the print may be left in the solution until it assumes the desired shade, and it will not be reduced any further in the fixing baths. The objections to omitting the acid are: The print is almost sure to be discolored, the grain of the paper is liable to show, the coating of the paper is sometimes eaten off in places, and it is more difficult to get the required contrast.

The action of the ferricyanide of potaesium without the nitric acid present is to form with the silver a soluble double cyanide; but when the acid is present, it probably breaks this up, forming an insoluble cyanide, which afterwards dissolves in the hypo solution.

Either under- or over-exposed negatives can be made to yield quite presentable pictures by this method, and it would be of value whenever pictures with great contrasts are required, as for wood engravings.

THE SEVENTH ANNUAL JOINT EXHIBITION.

THE Seventh Annual Joint Exhibition of the Society of Amateur Photographers of New York, the Photographic Society of Philadelphia and the Boston Camera Club was held under the auspices of the New York Society, at the galleries of the American Fine Arts Society, 215 West 57th Street, from April 16th to April 29th inclusive.

This exhibition, it was intended, should differ in two particulars from its predecessors.

First. That all work admitted to complete for awards should be new to Americans, no picture shown at any previous exhibition of the series being allowed to enter for competition.

Second. That all the work offered should be subjected to a preliminary judging, and only such work which possessed intrinsic merit should have a place upon the walls.

The accepted pictures, or at least such as had passed the above searching ordeal, were displayed upon the walls of the lower rooms of the Society's hall. We regret to say that the exhibition, although highly creditable to all concerned, as a whole was disappointing, as it was neither as large, varied or instructive as its predecessor held in Philadelphia just one year ago.

There was little or nothing upon the walls to show the chance visitor any of the great strides and progress made of late in the field of photography, or of the prominent place now occupied by the camera and sensitive plate in the development of modern arts and sciences. The preparation of photographic copy for the various reproduction processes, or the results themselves, now almost in universal use for book and magazine illustrations, were totally ignored. The same is true as to specimens of commercial photography, which now enters into almost every branch of our industrial enterprises.

Of course it may be argued that the display is merely an amateur exhibition; granting this fact, it should be borne in mind that the fuzzy, out-of-focus effects, now in such favor in certain circles, and which are imposed on an indulgent public as "art work," and

be-medaled by "impressionist" judges for "atmospheric effect," fail to impress the average visitor with either the value or usefulness of the photographic art science. Photography is not a mere scientific toy, to be used at will by any particular school of so-called modern art. An award of medals to this class of prints is apt to give the uninitiated an impression that they represent the highest development of photography, an opinion which fortunately is by no means the case.

It should be borne in mind that photography is one of the most useful practical discoveries of the present century, and its scope is secondary only to steam and electricity.

A comparison of the present exhibition with its predecessor shows that the number of exhibits exclusive of transparencies and lantern slides, number only about one-half of the number shown at Philadelphia a year ago, viz.:

1893—181 exhibitors with over 1200 prints. 1894—151 exhibitors with over 653 prints.

The composition of the exhibitors also forms an interesting study, the comparison showing

	1893	1894
New York	49	46
Philadelphia	45	15
Boston and Mass.	22	11
Great Britain	38	40
Continental Europe	5	20

The number of medals to be awarded was not to exceed twenty-five. Twenty-three only were granted, as will be seen by the following official bulletin.

Cornelius Van Brunt, New York. (677) Lantern Slides of Flowers, colored.

Mary E. Martin, New York. (696) Lantern slides.

H. A. Latimer, Boston. (669) Lantern Slides.

Earnest Edwards, New York. (714) A Storm at Brighton.

R. Eickemeyer, Jr., Yonkers, N. Y. (61) In the shade of the Willows.

Enrique Alexander, Barcelona, Spain. (108*b*) Homeward Bound.

Lewis Cohen, London, England. (324) Locating Camp.

J. N. Hignett, Chester, England. (71) The Thicket Walk.

Antonio Amattler, Barcelona, Spain. (127) Manœuvres of Spanish Artillery.

James L. Breese, New York. (543) Tableau, Miss M — As Statue of the Republic.

Charles I. Berg, New York. (44*d*) Meditation.

Baron Julius Waldberg, Vienna, Austria. (589) Plowing.

R. A. Wadsworth, Hartford, Conn. (560) Naubuc.

Hall Edwards, Birmingham, England. (626) Study from the Nude.

C. R. Pancoast, Philadelphia. (212) Midsummer on the Housatonic.

Clinton Oglivie, New York. (389) Foreground Study.

Emile V. Clarkson, Potsdam, N.Y. (99) On the Racquette.

James E. Goold, Newcastle-on-Tyne, Scotland. (614) Autumn.

James A. Sinclair, London, England. (711) Washing at Orta.

W. B. Post, New York. (405) Foggy Day off the Battery.

J. V. Black, New York. (391) Path Through the Woods.

Henry Troth, Philadelphia. (223) Fairbanks House, Dedham, Massachusetts.

Hinsdale Smith, Jr., Springfield, Mass. (303) Green River, Great Barrington, Mass.

The Board of Judges awarded the Medal offered by the President of the Society of Amateur Photographers of New York for the best print, entirely the work of the exhibitor, shown by any member of The Society of Amateur Photographers of New York, to

R. Eickemeyer, Jr., Yonkers, New York. (64) Sweet Home.

Judges. — Henry A. Ferguson, Wm. Baily Faxon, L. W. Seavey, Howard Russel Buttler, Frank La Manna.

We must again say as we did a year ago that it would be of great general interest to know upon what standard the Judges based their judgment in making the awards, as, apparently some of the best work was passed by as unworthy of award or notice, while the gilt disc appears on specimens which to the spectator seem hardly to be above mediocrity.

In this division of favors ten were awarded to New York, two to Philadeiphia, two to Massachusets, five to England, two to Spain, one to Austria and one to Connecticut.

The English exhibits were not so fine as they were a year ago, still some of the best exhibits were to be found among the efforts of the British workers. To show how the standard of excellence differs—a number of the pictures which had been successful in England were passed unnoticed here. Really artistic work received no recognition, while in bold contrast a gilt wafer graced, "Miss M— as Statue of the Republic," which was perhaps the most angular specimen of posing ever hung in a gallery or entered for competition.

In analyzing the action of the judges of the late exhibition some curious results are shown. A few examples will suffice.

Charles Scolik of Vienna, whose reputation is world-wide, was represented by ten superb platinotypes, but in the estimate of the judges of the Seventh Joint Exhibition, he was not equal to the average New York amateur. The same was the treatment received by Carl Srna, of the same city. Baron Julius Walding of Vienna, however, was more fortunate, as one of his efforts received recognition. This will prove an interesting topic for discussion at the Wiener Camera Club during the next season.

One of the gems of the exhibition was a tableau by the Gebrüder Lützel, of Munich, of six differently colored portraits transferred to one paper (carbon) near this exhibit was displayed the contribution (137–149), of prints in carbon and platinotype by Frederick Hollyer of London, perfect in technique and execution. Both failed to come up to the standard of the judges selected by the New York Amateur Society.

Prominent among the exhibits which attracted more than average attention were the flower and fruit studies (306–10) by Cassard. This series of pleasing pictures failed to impress the judges. A small hazy landscape, however, of a pronounced amateur type, having all the characteristics of the modern amateur exhibition photograph, displayed the coveted wafer.

Another example is seen in the case of J. E. Dumont, who shows several of the most pleasing effects in the rooms. The

platinotype, "The Columbus Caravels," was almost universally admired, as were his "Proposal" and "Sunrise." In the eyes of the judges all however failed to come up to their standard of excellence for recognition. A little 4x5 snapshot in the same room, a boat on the water, having nothing whatever to distinguish it from the result of the average button-presser, bore the stamp of approval from the censors.

And thus it is throughout the whole list, and one really comes to the conclusion that the chief aim and object of the judges was to encourage mere amateur work, and that of the home society in particular, as is shown by the number of awards bestowed upon members of the New York Society.

In looking over the list of awards it will be found that there were but two workers among the Philadelphia Society whose work was held to be of equal excellence with the New York amateurs, while the Boston Camera Club, which in the past has done so much commendable work,—in the present instance failed to produce a single member, whose *chef de œuvre* could compare with that of a dozen of his brother amateurs in New York.

Among the New York amateurs, who were exhibitors were Rudolf Eickemeyer, Jr., W. B. Post Prof. Geo. R. Cromwell, Wm. Geo. Oppenheim, Wm. A. Fraser. Fred Vilmar, Dr. J. Arthur Booth, Wm. D. Murphy, Nelson G. Palmer, Chas. Wager Hull W. J. Cassard, Lindsay C. Ivory, John H. Tarbell, A. Schweizer, J. Wells Champney, E. S. Bennett, Paul Sala, A. P. Schoen, A. L. Simpson, Dr. Edward Leaming, Chas. I. Berg, Henry W. Belknap, Clinton Ogilvie, Cornelius Van Brunt, L. B. Schram, F. R. Hitchcock.

Among the lady exhibitors are noted Mrs. E. J. Farnsworth, of Albany, Miss Edith Eliot, of New Bedford, Miss Sarah J. Hayes, of Boston, Miss Sarah J. Eddy, of Providence, Miss Annie M. Tweed, of Colorado Springs.

From New York are Miss Mary B. Martin, Miss E. V. Clarkson, Miss Elsie Mitchell, Miss Madeline Smith, Mrs. James Osborne Wright, Mrs. A. F. Arnold, and Miss E. Almy Slade.

The following comprise a few of the well-known foreign exhibitors: England.— H. P. Robinson, Robert Frost, Bernard

Lintott, W. A. Cadby, R. S. Webster, Frederick Hollyer, T. M. Brownrigg, Hall Edwards, Richard Keene, James Gale, Thos Mansell, J. V. Holcombe. Germany.— Linet Bohmer, Hugo Erfurth, Adolf Meyer. Austria.— Baron Julius Waldberg, Charles Scolik. Switzerland.—R. Phillipi C. Egger, Chr. Meisser. Holland.—W. & C. Jerezon Freres. Russia.—T. O. Tarassoff. India.—Herzog and Higgins. Italy.—M. Watson. New Zealand.—Robert B. Walrond. Spain.—Antonio Amatller, Enrique Alexander. Geneva.— Frederick Boissonnas. Toronto.— W. Braybrooke. Philadelphia.—Clarence B. Moore, Alfred Clements, Jos. H. Burroughs, John Struthers, John G. Bullock, C. R Pancoast, Robert S. Redfield, Chas. L. Mitchell, G. A. North.

Boston.—W. F. Whiton. O. A. Eames, Geo. H. Chickering, H. A. Latimer, Walter Chase, Geo. M. Morgan, James L. Little, Miss Emma J. Fritz, and Henry R. Peabody.

Hartford.— R. A. Wadsworth and H. O. Warner.

The officers of the Society of Amateur Photographers of New York, under whose auspices the exhibition was held, are President R. A. B. Dayton, Vice-President L. B. Schram, Recording Secretary T. J. Burton, Corresponding Secretary R. L. Bracklow, Treasurer C. C. Roumage. The exhibition was open day and evening, Sunday included.

On Monday, Wednesday, and Saturday evenings at 9 o'clock, special displays of Lantern Slides were made.

The Committee in charge of the arrangements consisted of Messrs. T. J. Burton, R. A. B. Dayton, and R. L. Bracklow, to whom great credit is due for the success of the exhibition, and who, it may be well to state are in no way responsible for the conditions which called forth the criticism in this report.

A very fine catalogue illustrated with photogravures from the negatives of J. Wells Champney, Miss E. V. Clarkson and Rudolf Eickemeyer Jr. was issued.

NEVER bear more than one trouble at a time. Some people bear three kinds—all they have ever had, all they have now, and all they expect to have.—*Hale.*

THE SELLA PHOTOGRAPHS.

THE collection of Sella photographs which was placed on exhibition at the Academy of the Fine Arts on April 9th is without parallel in beauty and interest. It includes five-hundred and thirty-nine large photographs, showing views of the Alps, Mt. Etna and the Caucasian Mountains. These were taken by Vittorio Sella, who is a nephew of Quintino Sella, formerly Italian Minister of Finance. He began his high mountain ascents in 1880, and has been taking photographs since that date in Switzerland, Italy and Russia His father wrote a treatise on Photography, and thus gave an impulse to his son's tastes. The present collection took the grand medal at the Geographical Congress in Turin in 1893, and has since been exhibited in the Art Club in Boston and the Cosmos Club in Washington. The collection is without equal in beauty and extent, and no conception of its realistic effect can be formed through a description. The views will make an especial appeal to those who contemplate a trip abroad. They will remain at the Academy, under the auspices of the Geographical Club, during the rest of the month.

No collection of photographs ever shown here has been so worthy of appreciation and study and admiration. Owing to the immense popularity of the camera as a means of amusement and recreation in these days, there is a tendency to deprecate its use in some circles, and to feel no especial interest in a photographic exhibition, but the work of Vittorio Sella is so remarkable and so wonderful an achievement that it cannot be disregarded.

From whatever point of view it is taken, it is extraordinary, and it is likewise beautiful, although the extraordinary and the beautiful do not often go hand in hand. As photographs they are superior to even the class of work that generally figures in exhibitions; the selection of the views makes them works of art, and scientifically they command study. Even the person who has not attempted the hazardous ascent of the Alps knows that it is a dangerous undertaking, consequently, when it is considered that Mr. Sella not only gained the high summits of these mountains, but carried an immense amount of photographic materials

up there, and then made successfully views of surrounding peaks, the wonderful aspect of the case is apparent.

No photographic mountain views have ever equaled these for true values, sharpness and detail, for those who know the mysteries of the photographic art appreciate the difficulties of successfully photographing snow. This Mr. Sella has done with rare success, and his work has assisted to a large degree the study of the Alps and the Caucasian Mountains Some of these were taken from an elevation of about three miles above sea level. Nearly every peak in the Alpine range that has any claim to notoriety at all has been a subject before Mr. Sella's camera.

The present display, which is made under the auspices of the Geographical Club of Philadelphia, having been loaned for the purpose by the Appalachian Club of Boston, of course does not contain all the results of Mr. Sella's campaigns on mountain tops, from 1880, when he began his annual photographic journeys to the present, but the 500 or more are practically complete, and are arranged with a view to study of particular groups in the mountains named. The Alps are divided into Dauphiny, the Grand Paradis group, Mont Blanc and neighborhood, between Mont Blanc and the Matterhorn, the Matterhorn and neighborhood, Dent Blanche and Weisshorn, Mont Rosa and neighborhood, Mischabelhorner and neighborhood, the Swiss Oberland, Monte Della Disgrazia, Bernina and other groups, and the Tyrol. Then there are eight views of Etna; and the Caucasians, of which comparatively little was previously known, are divided up into Elbruz and neighborhood, Suanetia, the central group, Fastakh-Khokh and Gluliukh Groups, and the Adai Khokh Group. Not the least interesting nor valuable of the series are the ethnological and pictorial views taken in the northern and southern valleys, which give an excellent idea of the character and manners of the people inhabiting them.

This valuable collection was arranged under the superintendence of Mr. Edwin S. Balch, who is himself an expert climber of the Alpine heights, and who was the first human being to ascend one of the almost perpendicular heights of one of the largest mountains shown in the collection.

HONOR TO A PHOTO-SCIENTIST.

A PUBLIC reception was given to Mr. Fred. E. Ives on Wednesday evening, April 25th, by the Photographic Society of Philadelphia, for the double purpose of welcoming him back from his extended sojourn in Europe, and at the same time to present to him the Society's gold medal, voted to him prior to his departure for Europe.

Upon this occasion Mr. Ives was introduced to the assemblage present by the secretary, Mr. Edmund Stirling, who, after a brief address, presented Mr. Ives with the special gold medal awarded by the Society for his solution of the problem of reproducing natural colors by photography.

Mr. Stirling, in the course of his address, stated that we are but too little apt to appreciate local work, but the present instance was an exception, and that the Society wanted Mr. Ives to appreciate what he himself was doing—that the priority of making perfect half-tone blocks belonged to him, also that the Society had watched his attempts to produce perfect color photography, and that now the Society wanted to tell him what they thought of him—further that by honoring their fellow-member the Photographic Society honors itself. It should not be forgotten that when Mr. Ives went abroad fifteen months ago, he went with the endorsement of the Society; this was another reason for congratulations.

The second purpose of this gathering was to place in the hands of Mr. Ives a permanent token of the Society's endorsement, made in recognition of Mr. Ives' many contributions to photographic Art-science. The world owes to him the half-tone reproductions--but this was only one of many of his results which would have rendered him famous. His crowning work, however, is Heliochromy; by applying the latest results he has brought about an achievement heretofore looked upon as impossible.

Some persons object to the process being called "Color Photography," and when he went abroad fifteen months ago

detractors claimed he had but appropriated the work of others. In each and every case, however, Mr. Ives had always given full credit, reference and dates, so that anyone could investigate for themselves.

Mr. Ives' work had been but little understood or encouraged. Now, however, we have perfect results both upon the screen and in the photo-chromoscope.

After this address Mr. Stirling presented the gold medal.

Mr. Ives then made a short reply in which he stated that he had been working upon this problem for sixteen years, and published the principle of his method in 1888, since which time he has invented and perfected special cameras, devices and methods for making the operation of the process—which is necessarily complicated—so simple and reliable as to be practicable in the hands of unscientific photographers. In one form of the process it is now as simple in operation as stereoscopic photography, it being only necessary to expose an ordinary commercial orthochromatic sensitive plate in a special camera, make a print on glass instead of on paper, and insert it in the inventor's "Photochromoscope" in order to reproduce the colors to the eye so perfectly that one appears to see the object itself, instead of a picture.

To the uninitiated it seems like a miracle when, by placing the uncolored "chromogram" in an instrument which previously showed only a disc of white light through the eye-piece, it is instantly transformed into a perfect reproduction of the object photographed. The same chromograms are shown with equal perfection on a screen by means of a special optical lantern and electric light, but last evening Mr. Ives demonstrated another form of the process, which produces permanent color photographs on glass, suitable for projection in the ordinary magic lantern and for window transparencies.

Beautiful examples were shown on the screen last evening including a plate of fruit, a girl's head, and views in Switzerland and the Yellowstone Park. It would be quite impossible by hand-painting to obtain such variety and delicacy of color, gradation, and blending in lantern slides as were shown in these,

which possessed also the important advantage of being true to nature in every detail.

Mr. Ives stated that, although the scientific character and success of his method had been industriously discredited by certain writers in Paris and Berlin, and their followers elsewhere, the highest authority in photographic physics, Captain Abney, C. B., F. R. S., etc., who is also distinguished for important original investigations in the field of color science, had fully indorsed the conclusion of the Photographic Society of Philadelphia and the Franklin Institute.

In connection with the above we will add an extract of remarks made on a recent occasion upon the subject of Capt. Abney, C. B., F. R. S., which fully endorses the views and action of our American institution.

Everybody who has been in any way impressed by the persistent efforts of Dr. Vogel and Leon Vidal and some of their followers to discredit the character and importance of Mr. Ives' investigations and inventions in color photography, should read carefully the testimony of a really first-class scientist, who is not only recognized as the highest authority in photographic physics, but who is equally well known in the higher circles of the scientific world for important original investigations into the physiology of color vision and the measurement and mixture of colors. On the occasion of Mr. Ives' recent demonstration (at the Camera Club) of the application of his photochromoscope system to the production of permanent color prints, and after the reading of a very hostile communication from Vidal, in which it was intimated that Mr. Ives had promised "unrealizable marvels," etc., etc., Capt. Abney, in summing up the discussion, said:

"Mr. Vidal, in his communication, says he does not want pictures by radiation, but by pigments. His remarks on this point may have been mistranslated, as the color of pigments is due to radiation. Then he says negatives cannot be produced regularly. I do not see myself why not. I know that when I am the lucky possessor of one of Mr. Ives' machines for turning out these three negatives simultaneously, I look forward to producing them at one time as a matter of the greatest simplicity. And then Mr.

Vidal, like some other people, expresses an unbelief in physiologists. I am not a physiologist myself except as relates to color vision, and into that region of physiology I have ventured a good deal. I suppose more rapid advance has been made in the physiology of the eye in recent times than in a whole century previously. Certainly Mr. Ives has appropriated those results of physiological investigation regarding the eye, and turned them to the splendid account, as we have seen to-night. And then as to *cliche* having to be eliminated, I suppose Mr. Vidal means that part has to be rubbed out. I should like to ask Mr. Ives if he rubs out any of his *cliche* or not? [Mr. Ives, "No, I do not."] I did not think he did.

"Mr. Pennell says he would like to have thirty colors instead of three. No doubt he can have thirty colors on his *palette*, but if Mr. Ives can use three colors with as great advantage as other people can use thirty, so much the better for him; and I think he has shown conclusively to-night that he can use his three colors with quite as much effect as some artists can use thirty. I have been struck with the beautiful way in which Mr. Ives has selected his printing colors — yellow, pink and green-blue. Anyone who has a knowledge of the theory of absorption is aware that they are just the colors which should have been selected, and that by being superposed any shade of color can be reproduced. It is not like superposing one light upon another that he gains his effects, but by absorption. Mr. Ives had adopted the right principle, and he has succeeded admirably in it.

"I think we have to congratulate Mr. Ives on what he has done for us. I have been a worker for many years in connection with this subject of color perception and vision, and while perhaps I have been doing the more theoretical part of the work, Mr. Ives has been applying the result achieved by others, together with myself, in this line, and I believe we must all have been gratified with the exhibitions we have seen on the screen of what he has done. To my mind, they certainly are excellent reproductions of the colors of natural objects."

"BOOK ILLUSTRATION."

THE closing lecture to the Library Class course at the Drexel Institute was given in the lecture room on Monday afternoon, April 9th, by the President of the Institute, Dr. James MacAlister, whose subject was "Book Illustration." The subject is one in which the Doctor is deeply interested, and his talk was brimful of instruction. In beginning his lecture, the speaker said it was impossible to do justice to the subject in one lectnre, but he would briefly review it as a whole. The illustration of books, he said, is as old as books themselves. It has been practiced also wherever literature has reached any considerable development. The oldest book illustrations are found in the books of Egypt. During his remarks the Doctor referred at length to the practice of illumination in Greęce and Rome, and told of the artistic work of some of the celebrities of ancient times. After speaking of the illumination of manuscript in the early Christian and Middle Ages, he said it was not, however, until the revival of art in Western Europe that the illustration of books reached its highest development. The illumination of manuscript survived till the end of the Seventeenth century. The change made to the illustration of books by the invention of printing, the close relation between printing and engraving, the gradual transition from the illuminated manuscript to the printed book, the decline of wood engraving, which led to the introduction of metal engraving, the revival of wood engraving and the growth of book illustrations, were each graphically traced by the speaker. In concluding Dr. MacAlister spoke of the successful work in magazines and periodicals of some of the more noted illustrators and of the potent influence their work has had in molding public opinion. In illustrating his lecture Dr. MacAlister exhibited many valuable books of the periods of which he spoke.

Thiosinamine.—M. Van Neck recommends for fixing purposes the use of a solution of 20 grammes, of thiosinamine, and 5 grammes of citric acid, in 1000 c.c. of water.

Lor cleansing negatives or prints which are as all discolored, 20 grammes of thiosinamine, 20 grammes of alum, and 10 grammes of citric acid, in 1000 c.c. of water.

He points out that thiosinamine is especially energetic on chloride emulsions, its action being hardly anything on silver bromide. By the addition of a little of a solution of chloride of gold to the first mentioned bath, a very permanent toning and fixing solution yielding good tones can be made.

Photographic Hints and Formulæ.

New Objectives of Zeiss, Goerz, and Steinheil.—Last year several new doublet objectives were introduced in which either one or both of the combinations are cemented triplets. Steinheil was the first, in 1890, to introduce such a lens. The Zeiss anastigmats, series IIa, *f*-8, introduced last November, are doublets containing five single lenses, which give good definition over a view angle of about 75° with full aperture. The older series, II, *f*-6.3, besides having greater intensity, includes a larger angle of view, but the new lens within its prescribed limits gives better results. The Zeiss anastigmat casket lenses are triple cemented landscape lenses, on the type of the Goerz double anastigmats, and two, which may be of different focal lengths, may be combined to form a rapid doublet.

The newest lens of these kinds is the "rapid-antiplanat" of Steinheil. Its aperture is about *f*-6.5, and it has a triple-cemented back combination. Its principal advantage is that its covering power with its full aperture is about equal to that of the older group-antiplanet with a medium sized diaphragm.—*J. M. Eder.*

Mixtol.—Dr. Ch. Decaux, of Caen, has lately published a formula for a compound developer, which no doubt will meet with the approval of the most pronounced amateur.

Boiling water	1000 ccm.
Sulphite of soda	120 grams.
Hydrochinone	15 grams.
Eikonogen	10 grams.
Red prussiate of potash	20 grams.
Carbonate of potash	75 grams.
Caustic potash	15 grams.
Bromide of potassium	1 gram.
Glycerine	10 drops.

For instantaneous exposures above concentrated developer can be used with but a small addition of water. For time exposures 3 parts Mixtol to 2 parts water. Above solution keeps well, and according to the learned compounder can be used repeatedly. P. S.—A leading Philadelphia amateur, who dropped into our sanctum while we were translating the above, states that in his experience with mixed developers, he would say that if 10 grams Metol (Andressen), 5 grams glycerine (Hauff), and 25 grams carbonate of soda (C. P.) were added to above it ought to be an ideal developer.

Society Notes.

The Photographic Society of Philadelphia.—The annual meeting was held Wednesday evening, April 11, 1894, at 8 o'clock. An election was held for officers, directors and committees on science and art for the ensuing year. The discussion on hot-pressed steel cylinders for holding gases was continued. Special exhibitions of lantern slides were given during the month by Mr. William H. Rau, on: "British Columbia, the Yellowstone, Seattle and Tacoma," and on members' night, Wednesday evening, April 25th, when a collection of slides, loaned by the Boston Camera Club, representing work of members, were shown, upon which occasion Mr. Frederick E. Ives was presented with the gold medal voted to him about a year ago. The Loan Exhibition of Photographs at the rooms of the Society was continued from April 11th to May 2d, "An American Lady's Italian Home," loaned by Mr. C. Emil Rönne, being the chief attraction.

The Minneapolis Camera Club.—The annual meeting of the Minneapolis Camera Club was held on the evening of April 11th, and was an occasion of interest among amateur photographers of the city, and considerable enthusiasm was shown by the large number present. The officers elected were: President, William Channing Whitney; Vice-president, A. L. Eidamiller; Secretary, C. J. Hibbard; Treasurer, Charles S. Fellows. The following board of directors was elected: Dr. C. A. McCullom, A. L. Broughton, W. B. Augir, G. W. Beech, H. E. Murdock, W. M. Tenney, The standing committee will be named by the board of directors at a future meeting. Reports of officers and committees, which were read, show the club to be in an excellent condition, the membership having more than doubled during the past year.

RECENT PATENTS.

518, 002.—Roll-holder Camera. E. B. Barker, Newark, N. J.

517, 539.—Camera. H. Casler, assignor of one-half to H. N. Marvin, Schenectady, New York.

California Camera Club.—The annual meeting of this club was held in the club rooms, Academy of Science Building, April 4th. A full report of this meeting will appear in our next issue.

In the Twilight Hour.

AN unarmed warrior is the sport of his foes.

THROW not stones or idle words at random.

BLOWS aimed at our neighbors recoil upon ourselves.

THE way to better your opportunities is to *improve* them.

IT will not make you any cleaner to throw mud at another.

EVERY dollar some men get widens the gulf between them and heaven.

THE more we help others to bear their burdens the lighter our own will be.

THEY who are nearest perfect are least on the alert to detect the faults of others.

CONSIDERING that the world is so wide it is strange that some people are so narrow.

DON'T snub a boy because of physical disability. Milton was blind and Kitto was deaf.

BY examining the tongue physicians tell the diseases of the body—philosophers the diseases of mind.

DON'T snub a boy because his home is plain and unpretending. Abraham Lincoln's early home was a log cabin.

DON'T snub a boy because he stutters. Demosthenes, the greatest orator of Greece, overcame a harsh and stammering voice.

HOW many people there are who are always ready to play "first fiddle" who won't touch a string when somebody else is to do it.—*Selected.*

USE preserves the steel which the rust o idleness rots.

THE pleasure-seeker is a man of many disappointments.

IT is hard to be a friend to a man who is an enemy to himself.

IF the devil had to travel without a mask he would never be followed.

PRACTICE the same kind of religion in the street car that you profess in church.

SURROUND a sinner with happy Christians, and he will either be converted or leave the country.

DON'T snub a boy because he chooses a humble trade. "The author of Pilgrim's Progress" was a tinker.

IT is not enough to have great qualities; we should also have the management of them.—*La Rochefoucauld.*

DON'T snub any one. Not alone because they may far outstrip you in the race of life, but because it is neither kind nor Christian.—*Christian Advocate.*

DON'T snub a boy because of the ignorance of his parents. Shakespeare, the world's poet, was the son of a man who was unable to write his own name.

DON'T snub a boy who seems dull or stupid. Hogarth, the celebrated painter and engraver, was slow at learning and did not develop as soon as most boys.

PRAYER has healed the sick and raised the dead: why cannot it secure wisdom to help us in our daily work? It can. Try it, and see if in your prayerful days you cannot do twice as much labor as in your prayerless days.